Chapter II

Types of Resources and their Discovery in HealthGrids

Aisha Naseer
Brunel University, UK

Lampros K. Stergioulas
Brunel University, UK

ABSTRACT

Adoption of cutting edge technologies in order to facilitate various healthcare operations and tasks is significant. There is a need for health information systems to be fully integrated with each other and provide interoperability across various organizational domains for ubiquitous access and sharing. The emerging technology of HealthGrids holds the promise to successfully integrate health information systems and various healthcare entities onto a common, globally shared and easily accessible platform. This chapter presents a systematic taxonomy of different types of HealthGrid resources, where the specialized resources can be categorised into three major types; namely, Data or Information or Files (DIF); Applications & Peripherals (AP); and Services. Resource discovery in HealthGrids is an emerging challenge comprising many technical issues encapsulating performance, consistency, compatibility, heterogeneity, integrity, aggregation and security of life-critical data. To address these challenges, a systematic search strategy could be devised and adopted, as the discovered resource should be valid, refined and relevant to the query. Standards could be implemented on domain-specific metadata. This chapter proposes potential solutions for the discovery of different types of HealthGrid resources and reflects on discovering and integrating data resources.
INTRODUCTION

Advanced communication channels and networks are needed as Healthcare is currently going through a series of technological advancements and modifications. As the two communities of Computer Science and Biotechnology join forces to create new technologies for the advancement of medical science and improvement of medical service delivery (Stewart, 2004), this means that more people will be able to lead normal, healthy lives.

It is widely recognised today that the healthcare industry requires customized solutions with respect to information integration. The information sharing techniques currently available are not sufficient to meet the requirements of an integrated healthcare system. The state of electronic information integration in healthcare lags noticeably behind other business domains such as banking, insurance and electronic commerce (Bilykh et al., 2003). There is a need for health information systems to be fully integrated with each other and provide interoperability across various organizational domains for ubiquitous access and sharing. Moreover, due to rapid progress of biotechnology, an increasing number of life science databases are becoming available that are being operated and managed individually (Tohsato et al., 2005). Many existing solutions still do not offer the desired levels of utility/functionality or sophistication that a health information system demands.

The emerging technology of HealthGrids (HG) holds the promise to successfully integrate health information systems and various healthcare entities onto a common (global) platform that would be shared and easily accessible. These entities include both humans and machines, such as scientists, scientific tools, medical instruments, physicians, patients and all types of healthcare data, etc. In such a scenario, each health information system is composed of various distinct components, which are integrated in a way that each component has its well-defined semantics and ontology and is well-aware of all other components.

The chapter starts by reflecting on the practical application of Grid technology to healthcare, and then presents a systematic taxonomy of the HealthGrid (HG) resources, outlining their characteristic features. The proposed taxonomy of the HG resources is based on their functionality, purpose, and application area. This chapter also discusses the issue of resource discovery in HealthGrids, which is an emerging challenge comprising many technical issues, such as performance, consistency of data/information, efficient retrieval of resources, compatibility of platforms, integrity of medical data, aggregation of storage resources and security of life-critical data, etc. Considering the challenge of resource discovery, it examines the problem of heterogeneity, issues of medical coding and terminology, and the role of semantic technologies. It also proposes potential solutions for the discovery of different types of HG resources. Finally, it reflects on discovering and integrating data resources and the future of HealthGrids and draws some conclusions.

CONTEXT: HEALTHCARE AND GRID TECHNOLOGY

HealthGrid is a Grid infrastructure dedicated to the management of healthcare resources that encompasses and integrates the various Grid components and healthcare components with consistent, compatible and meaningful coordination among them, to facilitate provision of the healthcare services (Naseer and Stergioulas, 2006c)

Thus, HealthGrid is a type of Grid that is used in the context of healthcare. HealthGrids are expected to possess enhanced, customized capabilities and features, such as:
Related Content

EEG Synchronization and Brain Networks: A Case Study in Fatigue
[www.igi-global.com/article/eeg-synchronization-and-brain-networks/138223?camid=4v1a](www.igi-global.com/article/eeg-synchronization-and-brain-networks/138223?camid=4v1a)

Study of Real-Time Cardiac Monitoring System: A Comprehensive Survey
[www.igi-global.com/article/study-of-real-time-cardiac-monitoring-system/145167?camid=4v1a](www.igi-global.com/article/study-of-real-time-cardiac-monitoring-system/145167?camid=4v1a)

ECG Data Analysis
[www.igi-global.com/chapter/ecg-data-analysis/43252?camid=4v1a](www.igi-global.com/chapter/ecg-data-analysis/43252?camid=4v1a)

The Use of Public Health Surveillance Data for Preventive Control of Diseases That Depend On Individual Risky Behavior: The Case of HIV Infection In Japan
[www.igi-global.com/chapter/use-public-health-surveillance-data/42610?camid=4v1a](www.igi-global.com/chapter/use-public-health-surveillance-data/42610?camid=4v1a)